PDP-1 COMPUTER
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PDP-28-1

TIME-SHARING SYSTEM CHANGES

July 18, 1966

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A new time-sharing supervisor has been written, correcting many of the shortcomings of the previous (Jan. 1966) system. The new system will go into effect as of 9:00 A.M. Monday, July 18.

I. Features:
   1. 8k for any user that requests it, if sufficient drum fields are available.

   2. No MYSTIC - ID for all users.

   3. Expanded arq's - ability to share drum fields.

   4. Higher performance - more rapid IO service.

   5. More drum fields in most cases.

   6. More efficient swapping of users.

   7. More equitable queuing algorithm.

   8. Faster searches and swaps in ID, in most cases.

   9. Continuous paper tape reading when switching users, in many cases.

   10. Saved "dia word" may be examined and modified in ID.

   11. Multiple proceed for last breakpoint that broke.

II. Details:
   1. Any user may assign core 1. Assignment and dismissal are as before. ($+c1$ to assign, $-c1$ to dismiss.) One drum field is used for each user with core 1 assigned. An unsuccessful assignment means that all fields are busy. Users are urged not to assign core 1 unnecessarily.

2. MYSTIC no longer exists. The "extended executive routine"
    has been removed also. Arq's are now processed in the
    executive routine. Every user has an ID, which is
    started immediately when a console is turned on. Each
    console requires two drum fields. (One for ID, the
    other for the user's "core 0".) If two fields are
    not available when a console is turned on, no action
    is taken. Turn off and on again to try again.

3. Arq's are now processed in the executive routine
    directly, and do not require two drum swaps. Hence,
    they take .5 to 1.25 m.s., compared with 84 m.s. in
    the old system. An arq instruction with the indirect
    bit skips when and only when the corresponding arq
    does not. Drum fields may be shared among several
    users, enabling each to read or write. The arq +sf
    works the same as +af except that the field is assigned
    for sharing. If the field is already assigned absolutely,
    the mode is changed, permitting other users to share it.
    If a field is assigned in shared mode, +af changes it
    to absolute. This will be successful only if no
    other consoles are using it. +1f and +f assign in
    absolute mode. -sf is exactly the same as -af.
    Example:

        console 5   console 6
        120003<sfF   120002<sfF

    Console 5's field 3 and console 6's field 2 both
    refer to the same real field, 12. Each may read
    or write. Other consoles may read it by referring
    to field 52, and may read or write by assigning it
    in shared mode. +xf exchanges the drum field translation
    table entries of the pseudo fields specified in the
    high and low 6 bits of the IO. For example, 040002<xfF
    may be used to move pseudo field 4 to pseudo field 2
    without dismissing field 4 and reassigning it as field 2,
    which would involve the risk of losing it to another
    user. If pseudo field 2 was assigned, that field becomes

field 4. This arq never skips. +f assigns n additional
fields, where n is in IO_{0-5}. It is equivalent to +1f
n times. It previously assigned or dismissed fields
as necessary to leave a total of n fields assigned.

4. In addition to vastly improved arq service, IO, call
button, and console on/off service is faster. An rpa
now takes about .9 m.s. It previously took 1.4 m.s.
It now takes 1 drum swap to turn on a console and
start ID, where it previously required 8.

5. Since MYSTIC and the extended executive routine do
not exist, and since core 1 is used for storage
even when no user has it assigned, more drum fields
are available. However, since every user has ID,
there may, in some extremely unusual cases, actually
be fewer fields than in the old system.

6. Both core modules are used equally, and users are
swapped into whichever is less busy or will require
fewer drum swaps. Drum swaps are, in general, held
to an absolute minimum.

7. Previously, if one user was typing very rapidly
and two or more users were continuously active, one
of them received much more frequent quanta. This bug
has been fixed.

8. The ID commands W, N, E, U, S, and Z are executed
in core whenever possible. (by bringing the appropriate field
into one core and running ID in the other). These
commands particularly E, run much faster.

9. When two 4k user are running, one of them reading
tape, no drum swaps are required to switch users,
so the tape moves continuously.

10. A new internal register W (dia word) has been added
    to ID. It lies between G (program counter) and
    F (flags). This contains the word which is stored
    from the IO when a dia is executed, and supplies
    the write field and drum address for the following dcc.
    Hence, if a breakpoint is placed between a dia and a
    dcc, the result of the dia may be examined and modified.
    Also, if an illegal instruction trap occurs on a dcc,
    the write field may be determined.

11. Multiple proceeds previously applied to the first
    breakpoint only, (the one in register B), whether
    that was the one which broke or not. Multiple
    proceeds now apply the last breakpoint that broke.
    Also, a bug in ID's replacement of instructions under
    breakpoints has been fixed.

III. This system is incompatible with the old in the following ways:

1. +f arq is different - see 3 above.

2. +af arq with 0 in the IO now does nothing.
   It previously assigned 1 field.

3. If it is impossible to log in, no message is typed.

4. Mystic and the commands to it have been removed. ID
   is started instead.